1920

Lead

Harry Bridgman Pulsifer

LEAD

By H. B. Pulsifer

The statistics of lead production for 1919 show extraordinary decreases in all directions. These were attributable to the general depression in the business in the early part of the year and the intentional curtailment of production to adjust the latter to the demand and prevent stocks from accumulating. At that time Europe was known to be struggling under an enormous accumulation and no foreign demand upon the American market was anticipated. Later in the year when domestic demand increased producers were unable to increase supplies with sufficient rapidity owing to labor troubles, which especially affected the Coeur d'Alene and southeastern Missouri.

The Globe plant of the American Smelting & Refining Co. at Denver, Col., was permanently closed early in the year, the smelting capacity of Colorado being far in excess of the ore supplies now tributary to those smelting centers. There was no new lead smelting construction of any importance during 1919.

In spite of the high price of silver toward the end of 1919, the year closed with practically the same smelting capacity as was reported for 1918. This capacity was, however, being used to a greater extent than before, and the probability is that several small furnaces were also operating about which no information could be obtained. Conditions in Mexico make it extremely difficult to obtain data from that country except in the case of American-controlled companies.[1]

PIG LEAD EXPORTED FROM THE UNITED STATES
(In pounds)

Destination.	1917.		1918.		1919.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Denmark	3,079,122	$278,634	647,048	$55,453	2,883,031	$227,778
France	3,315,325	279,982	1,746,541	131,060	6,656,171	452,719
Italy	3,652,702	328,219	3,148,617	220,515	.....	.....
Netherlands	279,262	25,203	.....	.....	1,724,949	95,721
Russia in Europe	28,008,580	2,638,063	230,156	18,412	4,000	280
Sweden	112,031	9,293	911,660	73,752	951,357	60,482
United Kingdom	53,502,244	4,858,941	126,909,858	8,921,786	46,404,068	2,851,214
Canada	66,997,874	5,670,535	31,587,591	2,094,612	4,147,181	242,987
Argentina	3,534,332	327,915	2,308,624	176,748	6,237,203	312,766
Brazil	2,927,654	283,624	3,837,896	294,195	3,743,199	268,315
China	174,481	14,199	533,339	35,988	1,273,194	66,791
Japan	2,433,783	190,154	17,231,731	1,218,430	23,687,710	1,077,394
Russia in Asia	1,432,461	116,670	598,733	50,910	5,100	425
Other countries	9,887,015	934,924	2,539,382	202,923	4,319,451	294,175
Total	179,337,866	$15,956,356	192,231,176	$13,494,784	102,036,614	$5,951,047
Total from domestic ore	107,376,638	$9,560,598	83,662,322	$5,889,381	22,320,299	$1,533,354
Total from foreign ore	71,961,228	6,395,758	108,568,854	7,605,403	79,716,315	4,417,693

[1] *Eng. Min. Jour.*, Jan. 17, 1920.

Imports and exports of lead for 1919 as reported by the United States Department of Commerce are shown in the accompanying tables, the figures of previous years being given for comparison.

IMPORTS OF LEAD, BY CLASSES, IN POUNDS

Year.	Lead in Ore (Lead Content).	Base Bullion.		Pigs, Bars, Sheets, and Old.	Total Lead Content.
		Gross Weight.	Lead Content.		
1911	35,686,180	141,481,852	138,952,372	5,264,800	179,903,352
1912	19,577,499	152,420,624	146,999,168	544,925	167,121,592
1913	19,883,313	96,908,170	94,327,654	82,999	114,293,966
1914	23,649,637	33,444,503	32,730,320	296,846	56,676,803
1915	18,185,140	86,247,995	83,986,988	819,282	102,991,410
1916	35,086,100	24,943,660	24,262,435	11,310,817	70,659,352
1917	41,292,876	107,279,997	103,664,970	11,585,974	156,543,820
1918	37,070,340	155,810,003	149,663,889	10,480,531	197,214,760
1919	19,573,856	115,317,160	112,024,518	10,214,753	141,885,718

IMPORTS OF LEAD, IN ORE, BASE BULLION, AND REFINED, BY COUNTRIES, IN POUNDS(*a*)

Country from which Imported.	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom	404,594	245,548	185,236	261,406	2,689,992	56,710	.....
Germany	262,132	4,529,919	.....	.....	.....	.....	.....
Other European countries.	143,293	123,085	32,537	314,353	255,907	5,800	.....
British North America	338,569	384,007	2,303,170	12,606,216	11,738,379	28,255,878	10,327,531
Mexico	95,693,439	46,282,207	94,247,384	48,395,670	135,782,759	162,259,199	115,436,528
South America	8,766,327	2,417,744	5,420,567	6,235,758	4,556,460	1,962,124	4,635,514
Other countries	8,685,612	2,694,293	802,516	2,845,949	5,520,323	4,705,049	1,198,801
Total imports.	114,293,966	56,676,803	102,991,410	70,659,352	156,543,820	197,214,760	131,598,374

(*a*) Bureau of Foreign and Domestic Commerce.

Market.—Throughout 1919 lead was in a better position than any of the other major metals, for the lead producers began curtailment of production immediately after the armistice, wherefore there was at no time any very great accumulation of stocks in the hands of producers. However, at the beginning of the year the same depression existed in this metal as in the others, the open quotation being about 5⅝ cts., New York, a figure not very much above pre-war levels. This did not prevent continuance of the decline. Demand was not only poor, but also there were constant rumors of ill-advised, uncoördinated attempts of Government bureaus, acting independently, to dispose of the rather large Government stocks at sacrifices, and unfortunately there was more or less truth in those rumors. Under such influences the market declined to 5 cts. and then, after a rally to about 5¼ cts., declined to about 4¾ cts. at the beginning of May. The stocks of lead in the hands of producers

at this time were estimated at 35,000 to 40,000 tons, which was an increase over what they were at the beginning of the year.

Abroad the situation was very bad. There was a very large accumulation of lead in Great Britain and even a larger one in Australia. All told the world's unsold supply of pig lead was estimated upward of 300,000 long tons, and that estimate was none too high. With this situation there was naturally an absence of demand for Mexican lead, and although a sharp curtailment of production in Mexico had already been made, it was necessary to carry it further.

Among the domestic producers the situation was very uncomfortable. The three Utah smelters which in March were running 16 furnaces were operating only 10 at the beginning of May. Ore supply in Colorado was so short that the Globe plant at Denver had to be closed. In the Coeur d'Alene production was considerably curtailed.

But as often is the case things looked darkest just before the approach of better times. Just when producers were feeling gloomiest the manufacturers of lead pipe and plumbers' supplies began to report an improvement in business, which appeared to be spreading eastward from the West, and indeed did so. This was followed by an improvement in the white-lead business. By the end of June the expansion in demand was in full swing and the price of lead had risen to 5⅜ cts.

By the end of July the statistical position was excellent, stocks in the hands of producers having been materially reduced. Under these influences the price advanced further, 6 cts. being reached and then 6¾ cts. about the end of October. At that time it looked as if there might be a runaway market, but appreciating, from previous experiences, the evils of such an occurrence, producers by common consent did their best to restrain it. The price for lead advanced to about 6⅞ cts. and fell back to 6¾ cts. with all signs that the crisis had been passed and that conditions were becoming easier, when suddenly Europe, after having bought largely of Mexican lead, began to bid for domestic lead in this market. The producers then abandoned all hopes and attempts to keep the situation in hand and letting things take their own course the market rose to 7½ cts.

The demand for lead in the United States market from Europe was rather unexpected in view of the large supplies existing over there. The explanation of the situation that developed abroad, quite unforeseen earlier in the year, was a prolonged strike that tied up the works of the principal Australian producer and severely curtailed its production. Added to this was the labor unrest in Spain which curtailed the lead production of that country. Finally, considerable parts of the stocks existing in Great Britain and Australia were not immediately available

owing to governmental red tape, shipping difficulties, etc. At one time it was said that it took longer to get lead out of the hands of the Government in Great Britain than it did to bring it from Australia.

AVERAGE MONTHLY PRICE OF LEAD PER POUND IN NEW YORK (*a*)

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
1905...	4.552	4.450	4.470	4.500	4.500	4.500	4.524	4.665	4.850	4.850	5.200	5.422	4.707
1906...	5.600	5.464	5.350	5.404	5.685	5.750	5.750	5.750	5.750	5.750	5.750	5.900	5.657
1907...	6.000	6.000	6.000	6.000	6.000	5.760	5.288	5.250	4.813	4.750	4.376	3.658	5.325
1908...	3.691	3.725	3.838	3.993	4.253	4.466	4.477	4.580	4.515	4.351	4.330	4.213	4.200
1909...	4.175	4.018	3.986	4.168	4.287	4.350	4.321	4.363	4.342	4.341	4.370	4.560	4.273
1910...	4.700	4.613	4.459	4.376	4.315	4.343	4.404	4.400	4.400	4.400	4.442	4.500	4.446
1911..	4.483	4.440	4.394	4.412	4.373	4.435	4.499	4.500	4.485	4.265	4.298	4.450	4.420
1912..	4.435	4.026	4.073	4.200	4.194	4.392	4.720	4.569	5.048	5.071	4.615	4.303	4.471
1913..	4.321	4.325	4.327	4.381	4.342	4.325	4.353	4.624	4.698	4.402	4.293	4.047	4.370
1914..	4.111	4.048	3.970	3.810	3.900	3.900	3.891	3.875	3.828	3.528	3.683	3.800	3.862
1915..	3.729	3.827	4.053	4.221	4.274	5.932	5.659	4.656	4.610	4.600	5.155	5.355	4.673
1916..	5.921	6.246	7.136	7.630	7.463	6.936	6.352	6.244	6.810	7.000	7.042	7.513	6.858
1917..	7.626	8.636	9.199	9.288	10.207	11.171	10.710	10.594	8.680	6.710	6.249	6.374	8.787
1918..	6.782	6.973	7.201	6.772	6.818	7.611	8.033	8.050	8.050	8.050	8.050	6.564	7.413
1919..	5.432	5.057	5.226	4.982	5.018	5.340	5.626	5.798	6.108	6.487	6.808	7.231	5.759

(*a*) From *Eng. Min. Jour.*

AVERAGE MONTHLY PRICE OF LEAD PER 2240 LB. AT LONDON (*a*)
(In pounds sterling)

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1905....	12.875	12.462	12.296	12.658	12.762	13.000	13.608	13.958	13.950	14.679	15.337	17.050	13.719
1906....	16.850	16.031	15.922	15.959	16.725	16.813	16.525	17.109	18.266	19.350	19.281	19.609	17.370
1907....	19.828	19.531	19.703	19.975	19.688	20.188	20.350	19.063	19.775	18.531	17.281	14.500	19.034
1908....	14.469	14.250	13.975	13.469	12.938	12.600	13.000	13.375	13.125	13.375	13.538	13.156	13.439
1909....	13.113	13.313	13.438	13.297	13.225	13.031	12.563	12.475	12.781	13.175	13.047	13.125	13.042
1910....	13.650	13.328	13.063	12.641	12.550	12.688	12.531	12.513	12.582	13.091	13.217	13.197	12.920
1911....	13.009	13.043	13.122	12.889	12.984	13.260	13.530	14.260	14.744	15.332	15.821	15.648	13.970
1912....	15.597	15.738	15.997	16.331	16.509	17.588	18.544	19.655	22.292	20.630	18.193	18.069	17.929
1913....	17.114	16.550	15.977	17.597	18.923	20.226	20.038	20.406	20.648	20.302	19.934	17.798	18.743
1914....	19.665	19.606	19.651	18.225	18.503	19.411	19.051	(*b*)	(*b*)	(*b*)	18.500	19.097	.....
1915....	18.606	19.122	21.883	21.094	20.347	25.170	24.611	21.946	23.151	23.994	26.278	28.807	22.917
1916....	31.167	31.988	34.440	34.368	32.967	31.011	28.137	29.734	30.786	30.716	30.500	30.500	31.359
1917....	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500	30.500
1918....	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	31.20	40.00	30.100
1919....	37.227	28.625	27.952	24.888	23.852	22.544	23.457	24.750	25.330	28.473	34.731	41.202	28.590

(*a*) The statistics for 1904–1905 are from the report of the Metallgesellschaft, Frankfurt-am-Main Those for subsequent years are from the *Eng. Min. Jour.* (*b*) London exchange closed.

In the United States during the second half of 1919 lead production was interfered with seriously by labor troubles. There was a strike, or at least cessation of work in the Coeur d'Alene; and later there was a serious labor trouble in southeastern Missouri and at the smelters in the vicinity of St. Louis. Possibly there was no time during the second half of 1919 when every lead smelter of the United States was in operation. As the year drew toward a close, however, there were signs of increasing production, and probably it will be found, as always, that high prices comprise their own corrective.[1]

[1] *Eng. Min. Jour.*, Jan. 17, 1920.

PRIMARY LEAD SMELTED OR REFINED IN THE UNITED STATES[1]
(Short tons) (Apportioned according to source of ore)[2]

	1911.	1912.	1913.	1914.	1915	1916.	1917.	1918.	1919.
Domestic Ore:									
Alaska	51	45	6	.....	358	659	884	.....	800
Arizona	3,428	3,891	4,901	5,602	6,953	15,328	7,456	6,252	5,000
Arkansas	15	.....	.....	52	51	170	300	34	.....
California	615	811	3,294	3,698	5,606	3,633	11,471	6,686	2,228
Colorado	30,442	37,039	42,840	41,198	32,352	33,046	29,327	145,424	17,825
Idaho	117,335	127,780	137,802	177,827	160,680	170,059	174,045	32,150	92,947
Illinois	308	513	619	427	910	670	867	2,273	.....
Iowa	.....	.....	.....	34	.....	.....	.....	.....	.....
Kansas	2,522	1,937	1,504	1,043	1,320	1,737	2,663	7,252	.....
Kentucky	.....	91	16	16	95	37	21	.....	.....
Missouri	182,203	162,610	152,430	194,275	195,634	218,253	218,197	104,175	.....
Montana	2,484	2,517	3,256	4,386	4,853	4,961	5,933	18,568	21,081
Nevada	1,082	5,699	6,142	5,996	7,664	11,858	12,334	11,658	6,279
New Mexico	1,371	2,511	1,821	741	2,157	3,290	3,428	4,118	.....
North Carolina	35	34	10	.....	.....	.....	.....	.....	.....
Oklahoma	1,925	2,500	3,214	3,916	4,346	10,969	19,646	56,097	.....
Oregon	11	21	37	17	11	9	.....	.....	1
South Dakota	33	12	7	2	5	12	34	5	.....
Tennessee	.....	.....	.....	.....	8	.....	.....	.....	.....
Texas	57	30	108	89	111	26	58	.....	.....
Utah	54,933	60,664	71,069	88,976	106,105	111,789	82,081	83,504	60,625
Virginia	400	85	878	143	457	740	147	.....	.....
Washington	612	53	9	2	11	217	929	2,636	850
Wisconsin	3,966	3,301	2,639	1,818	2,632	3,121	2,930	4,533	.....
Undistributed	48	120	63	99	131	159	145	.....	.....
Zinc residues	1,987	3,131	3,765	4,125	4,567	5,478	6,489	.....	.....
Total from domestic ore.	405,863	415,395	436,430	534,982	537,012	596,221	579,385	559,880	454,921
Foreign Ore:									
Africa	582	1,774	5,976	2,942	.....	328	1,738	1,519	.....
Canada	122	29	16	2	1,174	1,231	1,100	7,550	.....
Central America	28	.....	.....	.....	1	7	.....	.....	.....
Mexico	7,333	7,407	4,512	2,386	5,437	1,917	7,607	4,798	.....
South America	2,677	2,332	2,617	1,821	2,829	2,366	1,533	1,101	.....
Other foreign	22	30	102	488	140	236	3,894	84	.....
Foreign Base Bullion:									
Canada	.....	.....	.....	.....	.....	1,072	6,750	8,108	.....
Mexico	84,220	76,805	37,359	21,689	33,173	11,598	39,508	76,809	.....
South America	.....	.....	.....	.....	275	151	189	39	.....
Total from foreign ore and base bullion.	94,984	88,377	50,582	29,328	43,029	18,906	62,319	100,008	62,927
Grand total, derived from all sources.	500,847	503,772	487,012	563,810	580,041	615,127	635,669	641,704	517,848

[1] These figures include the lead derived from scrap and junk by primary smelters.
[2] U. S. Geol. Survey, except 1918 and 1919, which are Survey figures for mine outputs.

METALLURGICAL PRODUCTION OF LEAD IN THE UNITED STATES (*a*)
(Refinery statistics. In tons of 2000 lb.)

Year.	Domestic Origin.					Foreign Origin.		Grand Total.
	Desilverized.	Antimonial.	S. E. Mo.	S. W. Mo.	Total.	Desilverized.	Antimonial.	
1914	318,697	17,177	177,413	25,448	538,735	28,475	1,119	568,329
1915	305,160	24,601	185,849	20,312	535,922	43,301	2,883	582,106
1916	330,189	22,819	206,105	33,128	592,241	17,832	3,304	613,377
1917	319,015	16,265	205,861	40,575	581,716	50,962	2,991	635,669
1918	284,733	18,658	189,207	63,635	556,233	98,596	2,083	656,912
1919	226,085	14,864	158,182	55,790	454,921	61,380	1,547	517,848

(*a*) From *Eng. Min. Jour.*

PRIMARY REFINED LEAD AVAILABLE FOR CONSUMPTION IN THE UNITED STATES[1]

(Short tons)

	1914.	1915.	1916.	1917.	1918.	1919.
Supply:						
Stock in bonded warehouses Jan. 1	5,310	7,668	12,169	12,369	26,612	17,471
Imports—						
For consumption	7,501	9,780	10,878	7,087	105,530	62,894
For warehouse	20,837	41,116	24,452	71,185		
Increase by liquidation	.....	2,250	5,642	.....	800	.....
Production from domestic ores	512,794	507,026	552,228	548,450	539,905	424,433
Total supply	546,442	568,440	605,369	639,091	672,847	504,798
Withdrawn:						
Exports of foreign lead—						
From warehouse	21,545	38,618	9,880	37,652	59,416	40,976
In manufactures, with benefit of drawback	9,399	3,983	5,171	7,537	3,426	1,936
Exports of domestic lead	58,722	87,306	100,500	53,688	41,832	10,510
Decrease by liquidation	56	.....	.....	297	.....	.....
Stock in bonded warehouses Dec. 31	7,668	12,169	12,369	26,612	17,471	45,710
Total withdrawn	97,390	142,076	127,920	125,786	122,145	99,132
Available for consumption	449,052	426,364	477,449	513,305	550,702	405,666

[1] U. S. Geol. Surv.

AMERICAN SILVER-LEAD SMELTING WORKS

Company.	Place.	Furnaces.	
		No.	Annual Capacity.
American Smelting & Refining Co	Denver, Col	7	510,000
American Smelting & Refining Co	Durango, Col	4	210,000
American Smelting & Refining Co	East Helena, Mont	4	330,000
American Smelting & Refining Co	El Paso, Tex.	6	380,000
American Smelting & Refining Co	Leadville, Col	8	510,000
American Smelting & Refining Co	Murray, Utah	8	700,000
American Smelting & Refining Co	Omaha, Neb	2	82,000
American Smelting & Refining Co	Perth Amboy, N. J	4	170,000
American Smelting & Refining Co	Pueblo, Bol	7	380,000
American Smelting & Refining Co	Selby Cal	3	210,000
Bullshead Mining & Smelting Co	Spruce Mtn., Nev., P. O. Reno	1	11,000
Bunker Hill & Sullivan M. & C. Co	Kellogg, Idaho	3	300,000
International Smelting Co	Tooele, Utah	5	600,000
Northport Smelting & Refining Co	Northport, Wash	2	216,000
Ohio & Colorado Smelting & Refining Co	Salida, Col	4	360,000
Pennsylvania Smelting Co	Carnegie, Pa	2	60,000
U. S. Smelting, Ref. & Mng. Co	Midvale, Utah	7	530,000
Totals, United States	.....	77	5,559,000
American Smelting & Refining Co	Aguascalientes	1	50,000
American Smelting & Refining Co	Chihuahua	7	400,000
American Smelting & Refining Co	Monterrey, N. L	7	410,000
American Smelting & Refining Co	Velardena	3	150,000
Mazapil Copper Co	Saltillo, Coah	3	105,000
Cia. Metalurgica Mexicana	San Luis Potosi	10	360,000
Cia. de Minerales y Metales (*a*)	Cerralvo, N. L	2	38,000
Cia. de Minerales y Metales (*b*)	Guadalupe, N. L	1	77,000
Cia. Fundidora y Afinadora de Monterrey (*c*)	Monterrey, N. L	4	238,000
Cia. Minera de Peñoles (*d*)	Mapimi, Dur	6	310,000
Cia. Metalurgica de Torreon (*d*)(*e*)	Torreon, Coah	8	286,000
Totals, Mexico	.....	52	2,424,000
Consolidated Mining & Smelting Co	Trail, B. C	4	220,000

(*a*) Not in operation since Jan. 23, 1917. (*b*) Not in operation in 1919. (*c*) Smelter under lease to Cia. de Minerales y Metales. (*d*) Subsidiary of Cia. de Minerales y Metales. (*e*) Not in operation since Feb., 1919.

Silver-lead Smelting Works of North America

The *Engineering and Mining Journal* gives the accompanying list of lead-smelting capacity on this continent, as of Dec. 1, 1919. "Tons of Charge" means ore plus flux, but does not include coke. Where furnaces were not in blast for the entire year, the annual capacities were obtained by multiplying the average tonnage put through per furnace in operation, by the number of furnaces available at the end of 1919.

The small furnace of the Bullshead Mining & Smelting Co. is included in the list for the first time.

Lead Pigments

The accompanying table shows the quantity and value of lead pigments of domestic manufacture sold in the United States according to figures compiled by the United States Geological Survey.

PRODUCTION OF LEAD PIGMENTS IN THE UNITED STATES

Year.	Red Lead.		White Lead. (a)		Litharge.		Orange Mineral.	
	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.	Short Tons.	Value.
1904...	13,938	$1,672,569	126,336	$13,896,913	12,487	$1,248,691	1,125	$168,681
1905...	16,269	1,919,767	122,398	12,068,443	12,643	1,422,616	1,000	120,000
1906...	13,693	1,874,448	123,640	15,234,990	13,816	1,890,050	2,927	421,488
1907...	13,370	1,778,717	111,409	12,254,297	14,769	1,624,553	815	123,917
1908...	11,358	1,156,282	116,628	10,515,315	12,254	1,231,206	393	43,157
1909...	15,800	1,438,197	131,643	12,652,638	13,391	1,266,903	530	68,003
1910 (b)	16,116	1,482,672	134,276	13,024,762	13,659	1,283,940	541	70,335
1911 (b)	19,594	2,345,520	132,612	17,393,241	25,190	2,733,196	766	119,370
1912 (b)	21,120	2,571,702	146,833	18,683,461	29,111	3,194,194	545	88,240
1913 (b)	17,635	2,127,976	142,626	18,112,219	23,093	2,524,707	434	71,625
1914 (b)	18,697	2,151,054	159,474	19,943,239	27,345	2,856,092	426	70,019
1915 (b)	19,435	2,397,900	156,101	19,393,691	26,118	2,822,415	.....	.....
1916 (b)	23,035	3,933,566	128,979	21,274,480	37,739	5,853,543	(c)	(c)
1917 (b)	25,478	5,525,018	115,200	22,529,831	44,102	8,611,074	(c)	(c)
1918 (b)	30,069	5,928,597	102,888	20,766,848	48,874	8,825,724	(c)	(c)
1919 (b)	32,362	5,314,255	139,090	26,425,022	46,739	6,431,801	(c)	(c)

(a) The output of "sublimed white lead," a mixed sulphate and oxide of lead, is not included in 1904–1910. (b) U. S. Geol. Surv. (c) Orange mineral included in red lead.

IMPORTS OF LEAD PIGMENTS INTO THE UNITED STATES

Year.	Red Lead.		White Lead.		Litharge.		Orange Mineral.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1904.....	836,077	$30,115	587,383	$33,788	44,541	$1,500	766,469	$37,178
1905.....	704,402	26,553	597,510	34,722	117,759	4,139	628,003	31,106
1906.....	1,093,619	50,741	647,636	41,233	87,230	3,737	770,342	42,519
1907.....	679,171	35,959	584,309	37,482	90,475	4,386	615,015	37,799
1908.....	645,073	28,155	540,311	30,451	96,184	3,327	485,407	26,645
1909.....	760,179	30,428	694,599	39,963	90,655	3,740	496,231	27,562
1910.....	822,289	32,750	686,052	38,919	48,693	2,252	600,461	32,199
1911.....	1,163,533	46,170	741,071	46,213	24,662	1,196	504,734	28,515
1912.....	757,908	33,854	687,705	46,494	32,443	1,550	334,551	20,914
1913.....	99,832	4,903	672,109	45,266	34,023	1,750	330,525	22,205
1914.....	13,554	2,907	596,567	40,213	33,651	1,805	240,388	16,388
1915.....	1,968	142	239,187	24,608	20,650	1,422	171,572	14,061
1916.....	20,467	5,302	88,617	8,050	1,320	150	70,934	8,781
1917	50	13	20,238	1,965	*Nil.*	*Nil.*	33,294	4.8922
1918.....	5	1	158	131	100	12	*Nil.*	*Nil.*
1919.....	7,199	1,136	21,213	2,490	*Nil.*	*Nil.*	39,781	5,08

The pigments manufactured from pig lead, which are white lead, red lead, orange mineral, and litharge, show a decrease in average price per ton in 1919, the average decrease being 13 per cent.

The total quantity of pigments sold and their total value varied but little during the years 1917 and 1918. The difference, however, between the years 1918 and 1919 was more marked, the increase in quantity in 1919 having been 36,360 tons, and the increase in value $2,649,909 over that for the preceding year.

Lead Products Other Than White Lead[1]

The year 1919 opened with a declining market and with no demand for lead products. The feeling appeared to be general that because of the close of the war the price of lead must necessarily fall to pre-war levels, and many manufacturers and their customers permitted their stocks to become exhausted and their shelves bare. This condition extended over the greater part of the first three months of the year, and the trade in manufactured products was almost at a stand-still. The open winter was favorable to an early start in building operations, and toward the end of the first quarter a pronounced demand for lead products entering into building, such as lead pipe, sheet lead and lead traps, began to manifest itself, particularly in the West. The improvement noted in that section gradually spread to other parts of the country, and before the end of spring a lively demand for all lead products was in evidence, which soon appeared to have its effect upon the lead market.

Government stocks of lead and antimony, which had been hanging over the market in the early spring months, were gradually absorbed, and at the close of the year these had practically disappeared. This, by way of preface, applies to all of the lead products treated separately as follows:

Mixed Metals.—Lead, tin, and antimony mixtures, solders, and babbitt metals felt the stagnant demand of the earlier part of the year less than any of the other products of lead, probably because the industrial activity of the war period had not entirely spent itself. There was a constantly increasing demand for the entire year, and 1919 closed with a record of distribution probably unequaled in the history of the business. Neither the fall in the price of tin the latter half of the year, nor the sustained high price of the first half, had any appreciable effect upon the business done. Such Government stocks as were available appeared to be easily absorbed, and but for strikes pending at the close of the year the prospects for a continued demand in large volume are excellent.

[1] J. R. Wettstein, *Eng. Min. Jour.*, Jan. 17, 1920.

Shot.—Still higher prices prevail for ammunition than for preceding years, which doubtless had the effect of curtailing somewhat the demand for shot in volume. The domestic business was smaller than in 1918, though a considerable increase is to be noted in the export demand, which not only extended to countries that had in pre-war times drawn a supply of shot from this country, but also to other countries scattered all over the world, which had previously been supplied chiefly by Germany and England. True, this business has never attained large proportions, but the fact that it was done lends substantial evidence to the inability of European countries to adjust themselves to peace conditions. Early indications for 1920 business point strongly to a normal trade movement in this article in the United States, the evidence being thus early furnished by the booking of large business for loaded shotgun shells at this time for delivery during the first half of 1920.

Sheet Lead.—The war demand for sheet lead having been entirely satisfied—except in the case of new shipping still under construction—there was a decided slump in distribution for the first half of 1919, but a recovery occurred somewhat later, by reason of the intensive building operations carried on in all parts of the country. Demands from the chemical and acid manufacturers are only moderate, and not up to the normal requirements, so that sheet lead will show a substantial falling off compared with the demand existing in the two or three previous years. Manufacturing capacities were greatly increased during the war, and are ample to take care of any demands made upon them. The tonnage in 1919 was smaller than normal, but the prospects for 1920 indicate that a normal business may be expected.

Lead Pipe and Lead Traps.—Lead pipe and traps were among the first to give indication in the spring of 1919 that a decidedly improved demand was imminent. If the business done for the first three months of the year had approached the normal demand for that period, the record for the year would undoubtedly have shown the largest tonnages distributed in the history of the business. As it is, deliveries will be of normal volume, with indications that building activities in 1920 will continue to tax the manufacturing capacities of all plants during the greater part of the year.

Munitions.—Absence of war demand for munitions brings ammunition into a class where lead consumption is comparatively unimportant, aside from the one item of shot, separately treated. The demand for metallic ammunition, consisting chiefly of rifle and revolver cartridges, intended for sporting purposes, has probably been somewhat stimulated by reason of the war, and the business may be looked upon as having regained its normal status.

LEAD MINING AND PRODUCTION IN THE UNITED STATES

Alaska.—Most of the lead produced in Alaska has been won as a by-product in mining gold, silver and copper. Silver-bearing galena is widely distributed in Alaska, but until two years ago was little heeded. Since then the high price of silver has led the prospectors to search out some of the galena lodes and as a consequence some promising discoveries have been made.

During 1919 development work was done on galena ores in southeastern Alaska, in the Seward Peninsula, in the Yukon Basin, and probably in other regions. In the course of this work some ore was produced, but, so far as known, only a few tons of test shipments were made. The information at hand indicates that the most promising discovery of silver-bearing galena was that made in the Kantishna district. Alaska's lead output of 1919 is estimated to be 800 tons, practically all a by-product of the gold lode mines.[1]

Arizona.—The mine production of lead in Arizona decreased from 12,503,689 lb. in 1918 to about 10,000,000 lb. in 1919. The value of the output decreased from $887,762 to about $575,000. Large shipments of lead were made from the Shattuck mine, in the Warren district, in spite of the delay caused by a fire on the 800-ft. level in March. In Pinal County the property of the Ray Silver-Lead Co. produced considerable lead ore, though less than in 1918.[2]

California.—The mine output of lead in California in 1918 was 13,372,049 lb., valued at $949,415, and the estimated output in 1919 was 4,455,161 lb., valued at $253,944, a reduction in quantity of 8,916,888 lb. and in value of $695,471. The output of lead in California was 8,496,579 lb. less in 1918 than in 1917, and the figures for 1919 show a decided and continued decrease. The lead is mined mainly in the southern counties of the State—Inyo and San Bernardino—where a number of the mines in the lead and zinc camps have ceased or curtailed operations owing to the high cost of labor and material, high shipping charges, and the low price of the metal. The Darwin mine, Inyo County, was closed entirely during the year and the Cerro Gordo was worked only a few months on account of labor troubles. Other large producers made smaller output for the year and many small properties in the counties named remained idle.[3]

Colorado.—The mine output of lead in Colorado for 11 months of 1919 and the estimated output for December, according to data compiled by the United States Geological Survey, amounted to 35,650,000 lb. of lead, as compared with 65,960,760 lb. in 1918, a decrease of 32,160,000 lb.

Naturally the lead-copper plants in the State were not operated at full capacity. The Globe plant ceased to receive ores in April, 1919,

[1] U. S. Geol. Surv. *Press. Bull.* [2] U. S. Geol. Surv. *Press Bull.* [3] U. S. Geol. Surv. *Press Bull.*

but the Leadville, Pueblo, Durango, and Salida plants were worked at reduced capacity.

Lake County, chiefly Leadville, but including also Lackawanna Gulch, Sugar Loaf, and St. Kevin lode districts and the Arkansas River dredge district, produced 10,500,000 lb. of lead, as compared with 22,469,915 lb. in 1918. Early in 1919 the low price of zinc and lead caused the Leadville operators to post a reduction of $1 a day in wages, which the miners met by a walkout, and the result was a cut of 50 cts. a day in wages and the closing of several large properties.

Despite the removal of the pumps from the lower levels at Aspen early in the year there was a production of 647,000 oz. of silver and 5,000,000 lb. of lead, making an increase for silver but a heavy decrease for lead from that district.[1]

Idaho.—The mine output of lead, which is the most abundant metal in Idaho, decreased from 294,695,993 lb. in 1918 to about 185,894,000 lb. in 1919. The average price was somewhat lower, and the value of the output decreased from $20,923,416 to about $10,689,422. The Bunker Hill & Sullivan mine made the largest output of lead; the Hecla, Morning, and Hercules were the next largest producers. Considerable lead was also produced by the Tamarack & Custer, Gold Hunter, Consolidated Interstate-Callahan, Caledonia, and Sierra Nevada mines. The Coeur d'Alene district produced about 172,000,000 lb. of the total output of lead. In other districts of the State large quantities of lead ore and concentrate were shipped from the Idaho Continental, Pittsburgh-Idaho, Latest Out, and Independence mine, near Ketchum, in Blaine County. Large shipments were also made from the old Minnie Moore mine, near Bellevue.[2]

The State Mine Inspector reports the following lead production for Idaho since 1898:

1898	122,479,275
1899	86,499,506
1900	96,425,500
1901	65,967,000
1902	119,223,000
1903	220,857,956
1904	226,261,728
1905	260,791,456
1906	255,966,083
1907	234,404,920
1908	207,998,499
1909	217,594,679
1910	239,144,570
1911	274,492,873
1912	296,054,813
1913	318,377,280
1914	345,334,106
1915	369,242,000
1916	366,594,000
1917	395,883,000
1918	290,848,425
1919	185,894,000

[1] U. S. Geol. Surv. *Press Bull.*

[2] U. S. Geol. Surv. *Press Bull.*

Missouri.—The 1919 production of pig lead from the Southeastern or disseminated lead belt of Missouri aggregates about 153,300 tons, in which the December output is estimated. This is a shrinkage of about 9 per cent. below the 1918 output and about 22 per cent. below that of 1917, the record year. Though this decline is partly caused by working lower-grade ores, it is mainly due to the restrictions caused by the unsatisfactory demand and low prices that prevailed during the most of the year. In fact, it was only during the last four months of 1919 that the market was rendered attractive through better prices and the final working off of the excess stocks that had rapidly accumulated after the close of the war. The 6 cts. to 8 cts. market that has recently prevailed would have been profitable and would have stimulated a large output in pre-war times; but under the present excessively high costs for labor and supplies, it is no more profitable than a 4 cts. to 5 cts. market under normal conditions, which yields only a moderate to fair profit.

It is doubtful, however, if this district will again equal the 1917 output of 198,000 tons, when the abnormally high market and scarcity of lead stimulated marked activity. For the seven large mills (3000 to 6000 tons' daily capacity) in St. Francois County, which supplies 90 to 98 per cent. of the output, put such a pressure on the old mines that considerably lower grades have to be worked, and the ability to select only the richer portion of the orebodies, as was done when the mills were smaller, is now a thing of the past. The orebodies that have been discovered in recent years have not been as rich as in the earlier history of the district, and this must be the general tendency in the future, if the adjoining Washington County fails to yield in depth similar large disseminated orebodies below its much more numerous and richer shallow deposits. As Washington County has scarcely been prospected with the diamond drill, by means of which the discoveries and developments of the disseminated belt are carried on, it is not impossible that it will at least equal, if not exceed, the output of St. Francois within the next ten years, when it has been as thoroughly drilled as St. Francois County.

The occurrence of shallow lead has always been the guiding star—and a very reliable one—in St. Francois and Madison counties, and though the drilling will have to be deeper, or to 500 to 1200 ft. in Washington County, to reach the same 100- to 600-ft. productive horizons of St. Francois and Madison counties, it may eventually become the banner county when the present operators have the nerve to face 1000-ft. drilling. The drilling in St. Francois and Madison counties is so shallow and exceptionally favorable that it has discouraged the present operators from facing the higher costs in Washington County. When drilling can be carried on for 30 cts. to 75 cts. per ft., the Washington County costs

of $1.25 to $2.25 per ft. look excessively high, yet the latter figure is much below the usual expense for similar work in most mining districts. Washington County is therefore far more likely to be opened up by outside interests, which will be attracted by the low cost of land, $10 to $50 per acre, as against $100 to $1000 in St. Francois County and the highly promising evidence of much richer and much more extensive shallow deposits.[1]

During the greater part of 1919 the Joplin district lead and zinc smeltermen encountered a lessening supply of cars for ore shipments, resulting in advance payments on ore stored at the mines. It has been impossible to ship enough ore to establish a reserve supply at the smelters. In addition, a large reserve was in transit, many times sidetracked at some obscure siding, occasioned by the inefficiency of transportation service. In November shipping facilities were slightly relieved by the use of coal cars, not in demand during the strike of the coal miners. At the same time it was learned that 1600 cars were held for weeks in the distilling district of Kentucky alone for movement of liquor with the ending of war-time prohibition. The large tonnage apparent at the mines forms a corollary with restricted transportation that leaves ore stored here instead of at the smelters, presenting an analogous situation seeming to convert a reserve stock into a surplus. With the ore that is paid for delivered to the smelters, the mine reserve would be below normal.

LEAD ORE PRICES IN THE JOPLIN DISTRICT
(Per ton of 2000 lb.)

	Past Years.		1919.	
	High.	Average.		
1908	$66.00	$54.66	January	$63.07
1909	60.50	54.56	February	56.46
1910	58.00	51.98	March	58.37
1911	64.00	56.76	April	59.33
1912	68.00	56.60	May	55.47
1913	58.00	52.52	June	58.95
1914	54.50	46.55	July	63.24
1915	80.00	55.08	August	63.94
1916	104.84	84.07	September	66.42
1917	135.50	98.00	October	77.52
1918	106.00	88.98	November	86.59
1919	89.00	66.20	December	85.00
			Year	66.20

In the mining camps of Quapaw, Hockerville, St. Louis, Picher, Cardin, Tar River, Douthat, and Commerce, in Ottawa County, Okla., production was necessarily restricted in adjusting the output to the demand. Unlimited demand should have shown an increased rather

[1] H. A. Wheeler, *Eng. Min. Jour.*, Jan. 17, 1920.

than a decreased shipment. It was noted a year ago that this area would probably reach its zenith by mid-year, 1919. That statement was based on an unrestricted output. Though it has receded in output since June 30, it is not from exhausted reserves, and a large demand in 1920 will create a responsive activity that will carry Ottawa County over the top another year. Husbanding the reserves, together with systematic development, places this mining area in a position to meet all requirements that may arise.

With the growth of the mining industry around Treece, Kansas, and west of Waco, Cherokee County, a marked improvement was made in production of both zinc blende and lead in 1919. The old mines around Galena are largely abandoned, with only occasional small operations.[1]

Montana.—The mine production of lead increased from 37,135,875 lb. in 1918 to about 42,163,000 lb. in 1919, but the value of the output decreased from $2,636,647 to about $2,411,737. A large part of the lead was obtained from the lead-zinc ores of the Butte district. The Snow Storm mine, at Troy, Lincoln County, and the Angelica mine, in Jefferson County, were also notable contributors. By-products from the electrolytic zinc plant at Great Falls have added greatly to the totals of both silver and lead. The lead smelter of the American Smelting & Refining Co., at East Helena, was active on ores and concentrates, most of them shipped from Idaho and Montana.[2]

Nevada.—The mine output of lead decreased in quantity from 23,316,534 lb. in 1918 to about 12,558,000 lb. in 1919 and in value from $1,655,474 to about $718,000. The Prince Consolidated mine, at Pioche, remained the largest lead producer of the State, and the Virginia Louise, Combined Metals, and Black Metals mines, in the same district, shipped considerable ore containing lead. In Clark County the Yellow Pine mine made a lead production second only to that of the Prince Consolidated, and the Goodsprings Anchor Mining Co. shipped a rich lead concentrate. At Eureka the Eureka Croesus and Eureka Holly companies shipped much lead ore, but at Ward, in White Pine County, the Nevada United mine had a smaller output. The Groom mine, in Lincoln County, a large shipper in 1918, was idle.[3]

New Mexico.—The shipments of lead ore from New Mexico decreased heavily. Hardly any lead ore was shipped from the Organ Mountains district, and the shipments from the Central district, Grant County, and the Magdalena district, Socorro County, were less than in 1918, as were also the shipments from the less productive Cooks Peak and Victorio district, Luna County.[4]

[1] J. A. Zook, *Eng. Min. Jour.*, Jan. 17, 1920.
[2] U. S. Geol. Surv. *Press Bull.*
[3] U. S. Geol. Surv. *Press Bull.*
[4] U. S. Geol. Surv. *Press Bull.*

Oregon.—The output of lead in 1918 was 10,601 lb., valued at $753; the output in 1919 was 2000 lb. valued at $114, a decrease in quantity of 8601 lb. and in value of $639.[1]

Utah.—The mine output of lead decreased from 167,008,224 lb. in 1918 to 121,249,000 lb. in 1919, a decrease of nearly 46,000,000 lb. The value of the output decreased from $11,857,584 to about $6,935,000. The largest producers of lead in the State were the United States Mining Co., Utah Apex, Utah Consolidated, Ophir Hill, Silver King Coalition, Tintic Standard, and Chief Consolidated mines. Of the total, the Bingham district produced about 54,000,000 lb. There was a decrease in the Tintic district, where the mines produced about 24,000,000 lb. Shipments of ore and concentrate from the Park City region in 1919 amounted to about 63,325 tons, a decrease from 89,588 tons in 1918. Tabulation of the mines that made the largest production gave an estimated output for the district of 20,000,000 lb. of lead. The decrease was general, on account of the idleness of the mines during a two months' strike. The mines of Ophir and Rush Valley districts produced 73,000 tons in 1919, as compared with 81,475 tons in 1917. The main producers were the Ophir Hill Consolidated and Bullion Coalition mines. About 18,250 tons of ore was shipped from the Big Cottonwood, Little Cottonwood, and American Fork districts, as compared with a total of 35,269 tons in 1918. In Beaver County shipments decreased from 43,426 tons in 1918 to about 9400 tons in 1919.[2]

The Salt Lake Valley smelters operated at from 40 to 60-per cent. capacity during the year. Repairs and some improvements were made. Wages were reduced from 50 to 75 cts. in February and in July put back to the former scale. The smelters did not increase smelting charges in proportion to increased costs. During the summer season most of the plants ran about half of their furnaces, and there was no accumulation of ores for the winter stockpiles from heavy summer shipments, as heretofore. The U. S. Smelting Co. at Midvale ran three and four lead furnaces, as compared to six or seven the year preceding. This company produced considerable arsenic as a by-product from its bag-house and also some cadmium. The American Smelting & Refining Co. at Murray operated three and four lead furnaces, and toward the close of the year five lead furnaces, out of a total of eight. The copper smelter of the A. S. & R. at Garfield ran at a little less than half capacity, on account of the curtailment of the Utah Copper Co.'s operations. There were three reverberatory and one blast-furnace in operation during the last quarter. The International smelter at Tooele ran three and at times four lead furnaces, and one and two copper reverberatory furnaces. The installation of the

[1] U. S. Geol. Surv. *Press Bull.*

[2] U. S. Geol. Surv. *Press Bull.*

Cottrell system for the recovery of metals from the gases was completed on both the lead and copper sections.[1]

Washington.—The mine output of lead decreased from 5,271,815 lb. in 1918 to about 1,700,000 lb. in 1919. Most of the product came from the Electric Point property, near Northport, in Stevens County, which was idle most of the year. As the company resumed mining in November, the output is largely estimated.

The conditions and prospects in the smelting industry were by no means encouraging. The Northport Smelting and Refining Co. closed its lead plant on the 25th of February for the greater part of the year. As the smelter at Trail, B. C., refused custom ore from Washington, the Electric Point mine was forced to ship to Midvale, Utah. In March operations were suspended at this mine, which is the source of most of Washington's lead output.[2]

LEAD PRODUCTION OF THE WORLD
(In metric tons)

Year	Australasia. (a)	Austria. (a)	Belgium. (g)	Burma. (a)	Canada. (a)	France. (a)	Germany. (a)	Greece. (a)	Hungary. (a)
1905	106,418	12,968	22,885	.....	25,391	24,100	152,590	13,729	2,146
1906	93,557	14,846	23,765	.....	24,580	25,614	150,741	12,308	1,925
1907	96,608	13,598	27,450	.....	21,660	24,800	164,079	13,814	1,468
1908	119,207	12,669	35,650	.....	19,593	26,112	164,079	15,892	1,544
1909	77,992	12,941	40,306	.....	23,295	26,927	167,920	14,948	1,590
1910	105,897	15,476	40,715	.....	14,967	20,226	159,851	16,710	2,077
1911	105,397	18,097	44,308	.....	10,791	23,635	161,287	14,234	1,583
1912	113,710	19,993	54,940	.....	16,226	31,080	192,618	14,498	1,605
1913	(d)116,000	22,312	53,590	.....	17,089	(d)28,000	(d)181,100	18,309	(e)1,790
1914	.....	.....	45,560	.....	16,487	.....	.....	20,684	1,368
1915	.....	.....	16,770	.....	21,009	.....	.....	11,595	.....
1916	(g)139,000	.....	15,560	11,266	18,823	.....	.....	9,424	.....
1917	(g)160,000	.....	22,745	17,137	14,776	.....	.....	1,422	.....
1918	(g)175,000	.....	20,630	21,107	23,314	.....	.....	.....	.....
1919	.....	.....	.....	(b)17,931	19,911	.....	.....	.....	.....

Year.	Italy. (a)	Japan. (a)	Mexico. (a)	Spain. (a)	Sweden. (a)	United Kingdom. (a)		United States.	Totals. (f)
						Foreign Ores.	Domestic Ore.		
1905....	19,097	2,272	(b)101,196	185,693	576	7,517	20,977	290,472	988,727
1906....	21,268	4,305	(b) 73,699	185,470	753	6,984	22,691	323,567	986,980
1907....	22,978	3,067	(b) 76,158	(d)185,800	813	10,880	24,850	322,854	1,011,397
1908....	26,003	2,910	(b)127,010	188,062	277	11,480	21,336	284,858	1,057,205
1909....	22,133	3,429	(b)118,186	179,993	166	8,056	22,822	329,690	1,056,326
1910....	14,495	3,907	(b)120,662	190,523	355	8,933	21,866	353,186	1,093,043
1911....	16,684	4,160	(b)124,605	189,810	1,134	10,048	18,279	368,301	1,108,880
1912....	21,450	3,613	(b)109,717	232,612	1,073	(e) 8,255	19,473	376,947	1,212,252
1913....	21,674	(d)3,600	(b) 55,530	198,829	1,235	(d)30,500	18,462	396,034	1,142,264
1914....	20,464	4,563	.....	143,524	1,396	.....	19,684	485,011	.....
1915....	21,812	4,764	.....	171,472	1,918	.....	15,767	487,177	.....
1916....	24,362	11,343	(h) 19,971	147,407	2,076	.....	12,775	540,892	.....
1917....	16,237	15,807	(h) 61,122	172,909	3,174	.....	11,431	(g)527,729	.....
1918....	(g)25,000	10,769	(h) 98,837	169,709	2,241	.....	.....	(g)504,614	.....
1919....	.....	.....	(e) 67,380	.....	.....	.....	.....	(g)412,704	.....

(a) From official reports of countries unless otherwise denoted. (b) Exports. (d) As reported by Metallgesellschaft, Frankfurt am Main. (e) Estimated. (f) The totals may be high on account of duplications which cannot be eliminated. (g) From *Eng. Min. Jour.* (h) Production of pig lead in Mexico. Lead smelted from Mexican ore in the United States is not included either under Mexico or the United States.

[1] *Eng. Min. Jour.*, Jan. 17, 1920.

[2] U. S. Geol. Surv. *Press Bull.*

LEAD IN FOREIGN COUNTRIES

Australia.—During the war the British Broken Hill Proprietary and the other Broken Hill mines combined, through the medium of the Broken Hill Associated Smelters Co., and placed their lead business unreservedly in the hands of the British Government. The output was placed at the Government's disposal for war purposes provided the cost of production alone was assured. The lead contract with the Government expired on Mar. 31, 1919, and though the Associated Smelters had reason at one time to think it would be continued, at any rate for some months, this was not done. The situation was a difficult one, and was made more so by the action of the Government in following a policy which resulted greatly to Australia's disadvantage. The Government's first move in the direction of liquidating their surplus holding was to raise the price of lead £11 a ton to £40 per ton. Thus, in the face of exceedingly poor consumption they took a step which encouraged increased production and as a result the price soon dropped to below £23.

At £22 a ton lead is at a level that renders production in many parts of America and Europe quite unprofitable, and the world production was severely reduced during this period of low price. After the Associated Smelters became aware that the Government lead contract would not be continued, they were faced with many difficulties, and it was only after very hard work that shipment of lead from Australia was recommenced. The quality of the product and the support of customers in England were both favorable factors and all the lead that it was possible to ship was realized. The early shipments, however, did not represent more than a comparatively small proportion of the production, and prices did not leave much margin. During the last quarter of the year prices rose again to above the war level, and with this increase the Australian situation was much relieved.

The Associated Smelters have a plant capacity of rather more than 200,000 tons of lead per annum for export—a quantity sufficient to supply all the requirements of the United Kingdom, and leave a margin over. They are the largest exporters of lead in the world, and are consequently the determining factor of the world's market. Upon Australia's production the lead manufacturing interests of the whole of Europe and particularly of the United Kingdom largely depend.[1]

The British-Australian Lead Manufacturers' Proprietary, Ltd., is erecting extensive works in Australia for the production, from Broken Hill pig lead, of white lead and other colors.[2]

Burma.—Figures for the 1919 lead production of Burma are not yet

[1] *Metal Bull.*, June 17, 1919.

[2] *Comm. Rept.*, June 2, 1920.

available, but the exports of pig lead are given as 17,931 long tons, compared with 16,393 tons in 1918 and 13,164 tons in 1917.

During 1918 the plant of the Burma Corporation produced 18,641 tons of refined lead and 1,970,614 oz. of refined silver. In the first half of the year the estimated production of lead was nearly attained, and the production of silver was exceeded, but unfortunately operations were entirely upset by cholera and influenza epidemics which started in August, and the effects of which in the operations of the smelter lasted to the latter part of November. The Board has decided to erect an entirely new and modern lead smelting plant and reduction works having a capacity to produce 60,000 tons of lead and 5,000,000 oz. of refined silver per annum at Namtu. Plans of the new smelter and refinery are now being drawn up, and the preliminary steps in connection with the erection of the plant have already been taken.

Steps are being taken for the formation of a new company in India to take over the Bawdwin mine from Burma Mines, Ltd. The new company will be incorporated under the Indian Companies Acts, and will have a capital of 18,000,000 shares of 10 rupees each, of which 13,531,182 will be issued fully paid to Burma Mines, Ltd., as the purchase price, the remainder being held in reserve. These arrangements when carried through will entitle the shareholders in Burma Corporation, Ltd., to receive 14 shares in the Indian company for each share in the corporation.[1]

Canada.[2]—The production of lead in 1919 is estimated at 43,895,888 lb. valued at $3,057,788, or an average price of 6.966 cts. per lb., as against 51,398,002 lb. in 1918, valued at $4,754,315, or an average price of 9.250 cts., showing a decrease of 14.60 per cent. in quantity and 35.68 per cent. in value. The values are calculated on the average price of lead in Montreal.

The lead production represents the quantity of refined lead and pig lead produced in Canada from the treatment of Canadian ores, together with the lead estimated as recovered from ores exported to the United States. The 1919 production included 16,446 tons of refined lead produced at Trail, B. C., and 720 tons of pig lead produced at Galetta and Kingston, Ontario.

The lead ores exported amounted to 10,015 tons with a metal content of 10,437,351 lb. of lead, and were derived mostly from the mines of East and West Kootenay, British Columbia, supplemented by shipments from Notre Dame des Anges, Quebec.

The total mine shipments of lead ores and concentrates were about 57,813 tons, containing approximately 40,400,000 lb. of lead.

[1] *Metal Bull.*, Oct. 31, 1919.
[2] Prelim. Rept. Min. Prod. of Canada, 1919, Can. Dept. Mines.

The record of lead contents of ores and concentrates shipped and recoveries in smelters from domestic and imported ores are presented for comparison, together with a record of pig and refined lead produced.

	1917.	1918.	1919.
	Pounds.	Pounds.	Pounds.
(1) Production: Smelter recoveries from Canadian ore and recoverable lead in ore exported	32,576,28₁	43,846,260	43,895,888
(2) Lead contents of ores and concentrates shipped from mines in Canada	38,696,116	47,673,853	40,400,000
(3) Total production of refined lead in Canada (including lead from imported ores)	32,115,114	31,571,112	32,892,000

The exports of lead in 1919 were: lead contained in ores, concentrates, etc., 13,142,900 lb., valued at $616,278, and pig lead 11,326,800 lb., valued at $772,734, as against 22,684,100 lb. of lead in ores, etc., valued at $1,321,890, and 7,461,700 lb. of pig lead, valued at $668,807, in 1918.

The average Montreal price of lead was 6.94 cts. per lb. in January, then decreased slightly to 6.25 cts. in April, to increase gradually, reaching a maximum of 8.32 cts. for December.

This is the producer's price for lead in car lots as per quotations furnished by Messrs. Thos. Robertson & Co.

France.—In a report presented to the French Congress of Civil Engineers dealing with the lead industry of France, it was stated that the time is near when French works can produce all the lead required for use in that country. The Société de Pontgibaud with its works at Coueron at present produces half the French output, but the Penarroya Co. will, it is stated, certainly become the largest French producer with its four works at Megrine in Tunis, at Estaque near Marseilles, its Pyrenees works, and those of Noyelles-Godault. The Megrine works can produce 20,000 tons of lead a year from native ores, and those of Estaque about 40,000 tons, but the latter plant is not yet in operation, which remark applies also to the Pyrenees works, where local ores will be treated by an electrolytic process.

The works at Noyelles-Godault are being disposed of by the Malfidano Co. to the Penarroya interests. These works were destroyed by the Germans, and their owners have profited from this to liquidate an enterprise which had failed to yield them the results expected. The Penarroya Co. propose to reconstruct the plant upon new lines, which will enable the capacity to be increased materially. In addition to the foregoing works, there is the Langeac concern, which at present is idle, and that at Ceilhes (Herault) belonging to the Société de l'Orb, which makes a little antimonial lead. The Escalette works at Marseilles have recently

been acquired by the Grammont Co., and only treat Spanish and Greek silver-lead. The Compagnie des Metaux has purchased the St. Louis works at Marseilles, which refine Spanish lead. It is estimated that the normal post-war consumption of lead in France can hardly exceed that of the pre-war period, which was about 120,000 tons per annum. If, as is anticipated, the production of the new works amounts to 90,000 tons, there would be, with the pre-war production of 30,000 tons, 120,000 tons of lead available, which should be sufficient to provide for all French domestic needs. Even if there were a deficit of a few thousand tons, it would be easy to make this good by imports. The only uncertain factor indeed in the whole program concerns supplies of ore and other material to keep the smelting and refining plants going, and it is urged that this justifies special efforts for the development of the French Colonial mining industry.[1]

The French imports of silver-lead during 1919 were 4745 tons, compared with 7382 tons in 1918 and 3677 tons in 1917. The imports of soft lead during the same period amounted to 55,075 tons, against 44,696 tons in 1918 and 57,118 tons in 1917. The arrivals from Spain last year into France amounted to 46,070 tons, and those from the United Kingdom to 2696 tons.

Japan.[2]—The quantity and value of the annual production of lead in Japan from 1913 to 1918 is given as follows:

Years.	Pounds.	Value.	Years.	Pounds.	Value.
1913	8,393,138	$308,006	1916	25,268,685	$1,872,332
1914	10,138,205	412,400	1917	35,127,077	2,822,018
1915	10,567,457	486,729	1918	23,742,236	2,070,266

Okayama Prefecture leads in lead production. In 1918 the amount was given at 7,573,669 lb., valued at $675,975. Gifu Prefecture was next with 7,440,368 lb., valued at $646,442. Other principal lead producing Prefectures, in the order named for 1918, were Fukuoka, Miyagi, Akita, and Yamaguchi.

Producers and smelters were buoyed up by high prices ruling during the war and by the hope that strikes and political conditions in the United States, Spain, Australia, and Mexico, the principal lead-producing countries of the world, would create a world-wide shortage. However, this hope does not seem to have fully materialized, and the lead market has become quiet as a consequence. Paint manufacturers, having lost a considerable share of their trade with Singapore, the East Indies, and India, as a result of renewed competition from Europe, are only buying

[1] *Metal Bull.*, Feb. 23, 1920.

[2] *Comm. Rept.*

lead for actual needs. This, together with increased cost of materials for smelting and higher wages, has caused a considerable reduction in output as compared with 1917. If the 1919 figures were available they would undoubtedly show a still more noticeable decrease in amount and value, many of the companies having been forced into financial difficulties.

Prices for lead (Australian) reached their highest in September, 1918, when 1 picul (about 133 lb.) was worth $15.52 in Yokohama. The lowest was $5.85 per picul, in June, 1914. In March, 1920, the price was $13.21, a recovery of about $4 per picul since last October. However, mounting costs make lead mining and smelting increasingly less profitable to the small company run uneconomically, as most of them are, especially in view of high transportation charges. The cost of production of refined lead is estimated at about $8 per picul at the smelters.

Imports of lead and lead ore into Japan from 1915 to 1919 are stated as follows:

Years.	Lead Ore.		Lead Ingots and Slabs.		Other.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1915	(a)	(a)	32,279,973	$1,450,656	2,872,805	$175,860
1916	(a)	(a)	46,230,232	3,720,089	3,460,964	278,704
1917	50,520,532	$1,253,759	35,024,068	2,926,798	1,567,652	144,154
1918	7,989,466	191,130	120,283,002	7,351,379	1,447,808	153,538
1919	330,667	8,007	79,607,814	5,432,046	(b)	(b)

(a) Not known. (b) Statistics not yet available.

In 1915 Australia sold to Japan 24,599,868 lb. of lead ingots and slabs, valued at $1,102,933. The same year the United States sold to Japan 5,790,156 lb., valued at $248,307. In 1919, while imports of lead slabs and ingots from Australia had only increased to 32,366,341 lb., valued at $2,551,042, imports from the United States jumped to 27,239,280 lb., valued at $1,604,866.

In 1914 Japanese consumption of lead was estimated at 43,753,000 lb., a great share of which was imported from Australia. In 1918 the estimated consumption had reached 144,025,000 lb.

Jugo-Slavia.[1]—Two former Austrian concerns are engaged in the production of lead in Jugo-Slavia—namely, the Bleiberger Bergwerks-Union and the Blei and Silberhutte Littau. The former undertaking produced in the first half of 1919, before being sequestered, 1193 tons, and 3381 tons in the second half of 1919 under the administration of the sequestration authorities. The second producer had an output of 1044 tons in 1919, but has apparently now suspended operations owing to shortage of raw material.

[1] *Metal Bull.*

Rhodesia.—The deposits of the Rhodesia Broken Hill mine consist at the surface of oxidized ores of lead and zinc, while boreholes have proved the existence of sulphides at depth. At present the leady portions are being smelted and the output of metallic lead is about 1200 tons per month. The smelting plant is being extended so as to double the capacity, the blast-furnaces treating picked ore high in lead.

The problem of extracting the zinc from the oxidized ores remains to be settled. Altogether there exists probably over a million tons of oxidized ores containing about 35 per cent. of zinc with lead, which, owing to local conditions, will require special processes of treatment. It is hoped to produce a certain amount of zinc oxide for sale as pigment. It seems probable that the electrolytic method will be preferable to distilling, for water power is available for the generation of current, and the necessary acid can be made from sulphides.[1]

Mexico.—The local smelters in Monterey were seriously affected by the price of lead in the British markets, as the smelters in Monterey pay the mines for the lead contents of their ores at the price of lead in London at the date the ore is purchased in Monterey.

When the British Government stopped the control of the prices of metals, the value of lead jumped from £29 to £40. The Monterey smelters considered this only a temporary flurry in the market, and refused to buy lead ores until the market settled down again. As a result numbers of the mines in the northern part of Mexico were obliged to reduce their staff, and many changes were made in both the Mexican and foreign employees.[2]

South Africa.—Small pockets of galena, in some cases argentiferous, are frequently found in the dolomite series of the Transvaal. In the Pretoria series true veins are found carrying galena either alone or associated with gold, silver, copper and cobalt. In the Pretoria, Rustenburg, and Marico districts are many vein deposits of lead ores associated with copper, the best known being the Transvaal Silver mine in the Pretoria district, where argentiferous galena is associated with iron pyrites, copper pyrites, copper carbonates, and tetrahedrite, in a gangue of siderite (carbonate of iron). This vein is associated with a diabase dyke. At the Willows mine is a very similar deposit but without the lead ore. At Edendale, four miles north of Hatherley—also in the Pretoria series—a vein has been worked in which galena occurs in conjunction with zinc blende and the usual oxidized ores of lead and zinc. The gangue material is mainly quartz and calcite. At Leeuwkloof (Pretoria district) and Rhenosterhoek (Marico district), in the Transvaal, lead ore has also been worked. At Leeuwkloof the galena occurs in the

[1] *Mining Mag.*, Oct., 1919; *Metal Bull.*, Oct. 24, 1919. [2] *Comm. Rept.*, Apr. 2, 1919.

form of a large chute in the dolomite underlying the shales of the Pretoria series, and at the contact with the shales. The chute runs northwest and southeast, and dips to the southwest. The galena is of good quality, the 700 tons so far extracted averaging 73 to 75 per cent. of lead. The silver value is very constant, always being between 2 and 4 oz. per ton. Associated with this lode is a large body of iron pyrites.

At a number of other localities in the Transvaal, lead has been mined in the past, but the mines are at present shut down—some only on account of the war. The chief localities are Witkop, Bokkraal, Buffelshoek, Reitspruit and Doornhoek—all in the Marico district—Broederstroom, Edendale, Dwarsfontein, and Roodekrans—all in Pretoria district—and Windhuk, in Pietersburg district. Throughout the whole of the dolomite area of the Transvaal irregular deposits of galena are found and occasionally worked, the ore being sold to the ore-reduction companies on the Rand.

In the Cape Province lead ores occur at the Maitland Mine (Port Elizabeth) associated with copper, silver, and antimony, at Banghoek, 40 miles west of Hopetown, in quartz veins at Knysna, at Richmond, and in the Beaufort West and Victoria West districts. In the Bokkeveld series of the Caledon and Swellendam districts of the Cape Province a number of white quartz veins are noticed, some containing small quantities of galena, with copper and iron pyrites. These do not appear to be of commercial importance. A little galena has also been obtained from a vein in a Karroo dolerite near Sutherland.

Since lead ores have been proved to occur at numerous localities where dolomite is found, and since they seldom form easily recognizable oxidation products at the surface, it seems extremely likely that there must be numerous occurrences still undiscovered.[1]

Spain. —The Spanish lead trade was hit very hard by the end of the war, which has found the world gorged with lead. Time is required to digest the big stocks piled up by the Allies, and there appears to be every prospect of increasing competition for business, since Australia, America, Canada and Spain among other producers are all seeking to develop markets.

The Spanish exports of silver-lead during January-December, 1919, were 21,297 tons (17,678 tons to the United Kingdom and 3319 tons to France), against 16,372 tons in 1918 and 21,418 tons in 1917. The exports of soft lead during the same period were 87,440 tons, compared with 127,411 tons in 1918 and 133,460 tons in 1917. The shipments during the twelve months included the following: to France 48,381 tons,

[1] *So. Afr. Min. Eng. Jour.*

to Belgium 14,420 tons, to the United Kingdom 16,377 tons, and to Italy 3705 tons.

The report of the directors of the Penarroya Company for 1918 says that the fall in the price of lead had its effect upon the exploitation and production at small mines in the Cartagena district, of which several closed down, but none of these was of very material importance. In a general way the mineralization is well maintained in the larger mines, and the reserves of ore brought to grass inspire confidence in the company's future. For all this, however, the lead deposits are getting poorer in depth, and that is why the company is systematically developing new areas, which appear to offer promising results. The Compania Minera de Badajoz has been much hampered in its operations by labor difficulties and the lack of fuel. The Societe Minera de Sierra Carolina, formed with the Compagnie d'Aguilas, is commencing development work. The Penarroya Co. contributed to the formation of the Compania Minera de la Coruna, established by English firms (including the Minerals Separation, Ltd.), with the object of prospecting copper deposits in Galicia. In spite of the difficulties, exploration work has been actively carried out at Cogolin (Var) and at Pierrefitte (Hautes-Pyrenees). In Algeria and Tunis the company is interested in a number of mining properties which are contributing ores to the smelters. In order to maintain the company's position in respect of technical progress, they have entered into an arrangement with the Minerals Separation, Ltd., to grant them a license for the use of the flotation process in the company's installation, and also to represent the patentees in France and in Spain.

The smelter production of the Penarroya last year was 125,000 tons of lead, 1295 tons of spelter, and 82,887 kg. of silver. The drop in the production of the Spanish mines already noticeable in 1917 was accentuated in 1918. The fall in prices added to the uncertainty of the markets and restrained development work; several mines stopped altogether, and most of them curtailed output. The company's smelters experienced fairly normal conditions, except that at Marseilles, which was hampered by the lack of ore. The Bleyberg works, which were occupied by the Germans early in the war, have been recovered without grave damage, but all the ores, metals, and material in warehouse were requisitioned and carried away.[1]

United Kingdom.—The following tables show briefly the status of the lead market during the year.[2]

[1] *Metal Bull.*

[2] *Metal Bull.*

	Long Tons.
Government stock, Jan. 1, 1919	62,852
United Kingdom imports during 1919	217,610
Total available supply	280,462
United Kingdom exports during 1919	10,803
Balance available for home trade	269,659
Government stock, Dec. 31, 1919	54,975
Apparent home consumption	214,684

UNITED KINGDOM LEAD EXPORTS
(In Long Tons)

	1918.		1919.	
	English.	Foreign.	English.	Foreign.
January	300	.....	1,042	.....
February	289	.....	596	.....
March	96	.....	1,252	.....
April	165	.....	1,030	203
May	326	.....	1,023	229
June	591	.....	1,073	132
July	477	.....	1,854	220
August	515	.....	4,091	700
September	528	.....	2,145	1,114
October	675	.....	4,222	3,181
November	204	.....	3,298	2,576
December	744	.....	3,944	2,449
Total	4,918	.....	25,570	10,803

UNITED KINGDOM LEAD IMPORTS

From	1918.	1919.
Spain	49,977	39,502
U. S. A	61,576	53,008
Mexico	.....	2,114
Australia	85,280	93,276
Elsewhere	11,099	29,710
	207,932	217,610

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